# Data Bulletin

# Preventive Maintenance and Troubleshooting Guidelines for Class 9013F and 9013G Pressure Switches

**Retain for future use.**

## Introduction

This data bulletin describes how to identify and correct the most common maintenance issues for the Class 9013F and 9013G Pressure Switches.

Ensure that all maintenance recommended by the original equipment manufacturer (OEM) is performed. If the equipment fails to operate properly, refer to the instructions and recommendations provided by the OEM, and ensure that the instructions were correctly followed. If the operating problems persist and a pressure switch is the suspected cause, use the information in this bulletin to assist in troubleshooting the issues.

## Inspecting the Pump System

### Before the Initial Operation

Inspect the following items before operating the pump system:

1. Check the pump's yield and flow rate.
2. Check the well water level, drawdown, and recovery.
3. Check the line voltage with the pump on and off.
4. Verify that the running current does not exceed the motor nameplate data.

### Before Maintenance

Inspect the following items before performing maintenance to the pump system:

1. Visually inspect the pump system for leakage.
2. Check the pressure switch using a pressure gauge.
3. Record the pressure switch setting if available.
4. Review any system discrepancies or perceived problems in operation.
5. Confirm that electrical power is available and that circuit breakers (or fuses) are operational.

## Providing Routine Maintenance

During the normal maintenance period for the pump system, ensure that the following steps are followed to for all pressure switches.

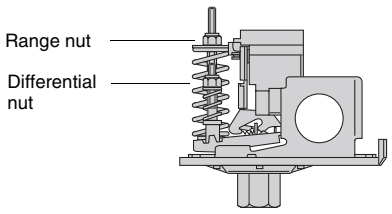
1. Disconnect the power.
2. Remove the cover.
3. Visually inspect the pressure switch for leakage. Verify that:
   - — No liquid is leaking from the diaphragm or flange area.
   - — The flange is not corroded.
   - — The area is free of standing water and wet spots.

4. Check all plumbing connections. Verify that:
   - — The flange is not corroded.
   - — The fittings are secure and without white residue (lime deposits).
5. Check all electrical connections. Verify that:
   - — The wires are not pinched or frayed, and the insulation is not cracked.
   - — There are no insects, contamination, or nests. If found, remove.

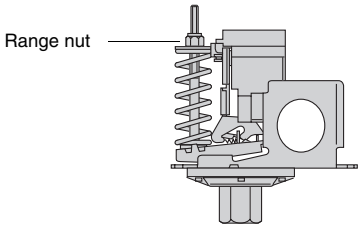
   **NOTE:** Contacts may appear pitted. Do not sand or file the contacts. Do **not** use chemicals to clean the contacts.
6. Check the system pressure using a pressure gauge.
7. Replace the cover.
8. Restore the power and confirm pump system operation.
9. Open a tap or spigot to confirm water flow.
10. For devices with low pressure cut-out (Form M4), hold the lever to Run until the pressure is within 10 psi of the cut-in pressure.

## Adjusting the Pressure Switch

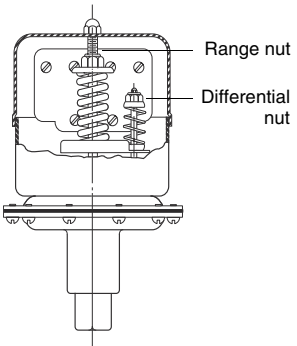
**Figure 1: 9013F/9013G Pressure Switches With Adjustable Differential**




**Types FSG, FYG, and FRG**




**Types FTG and FHG**




**Type G**

1. Monitor the pressure gauge during operation to determine the points where the pressure switch turns on and off.
2. Determine whether to adjust the cut-in, cut-out, or both.
3. If using a tank with an air bladder, determine what air pressure is required in the bladder.

   **NOTE:** Follow the manufacturer's instructions for setting air pressure to the required level for the new adjusted pressure switch setting. When instructions are not available, always set the air pressure in the bladder to 2 psi below the new desired cut-in pressure. Perform the following steps to set the air pressure:
   a. Turn off the power to the pump.
   b. Drain the water from the pressure tank.
   c. Using a pressure gauge, take a pressure reading of the tank.
   d. Using the air valve, add or remove air from the tank bladder until the correct pressure is reached.
4. Perform Steps 1–6 of “Providing Routine Maintenance” on page 1.
5. To increase or decrease the cut-in and cut-out settings (while maintaining the same differential) adjust the pressure switch with a 3/8 inch nut driver or socket as follows:
   a. Turn the range nut clockwise for higher cut-in pressure, or counter-clockwise for lower cut-in pressure. See Figure 1.

      **NOTE:** Adjusting the cut-in setting does not change the differential. As the cut-in value changes, the cut-out value changes by the same amount and in the same direction. For example, increasing the cut-in pressure by 10 psi will also result in an increase in the cut-out pressure by 10 psi.

      When lowering the pressure setting, remember that most bladder tank water systems are designed for the bladder pressure to be 2 psi below the cut-in point when there is no water in the tank.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b. Use the table below as a guideline for setting range nut R.

| Original Setting | New Setting | Turn Range Nut R Clockwise |
|---|---|---|
| 20-40 | 30-50 | 3-1/2 Turns |
| 20-40 | 40-60 | 8 to 8-1/2 Turns |
| 30-50 | 40-60 | 3-1/2 Turns |

c. Complete Steps 7 and 8 of “Providing Routine Maintenance” on page 2.

6. To increase or decrease the cut-out setting (while maintaining the same cut-in pressure) adjust the pressure switch with a 3/8 inch nut driver or socket as follows:
   a. Complete Steps 1–6 of “Providing Routine Maintenance” on page 1.
   b. Turn differential nut D clockwise for higher cut-out pressure, or counter clockwise for lower cut-out pressure. See Figure 1 on page 2.

      **NOTE:** Adjusting the differential changes the cut-out setting. The cut-in does not change.

   c. Complete Steps 7–9 of “Providing Routine Maintenance” on page 2.
7. Monitor the system to ensure that the pressure setting is as desired.
   a. Open a faucet and drain water from the system until the pump turns on.
   b. Turn off the faucet.
   c. Monitor the system pressure to identify the point where the pump turns off.
   d. Repeat Steps 5–7 as required.

## Renewal Parts

**Table 1: Renewal Parts**

| Description | Part Number | |
|---|---|---|
| | 9013F | 9013G |
| Contact kit with contact block, contacts, and diaphragm | 9998PC241 | 9998PC205 |
| Replacement cover[1] | 65076 605 50 | 665133 559 50 |

[1] Include the complete part number of the pressure switch to be used with, including all forms.

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# Troubleshooting

**Table 2: Troubleshooting Tips**

| Condition | Possible Causes | Description/Corrective Action | Corrective Procedure for Qualified Service Personnel |
|---|---|---|---|
| **No water flow** | Power is off | Confirm that the power is on. | — |
| | No water in pressure system | Confirm the pressure tank pressure reading.<br>A. If the pressure is below cut-in, and the switch has low pressure cut-out (Form M4), hold lever in the Run position.<br>1. The pump should turn on and run.<br>2. When you release the lever, if the M4 feature cuts out the pump again (within 10 psi of cut-in), the water source is low.<br>3. Do not actuate the M4 lever again until source has recharged (the well has water in it).<br>B. Where Form M4 is not present, check the water source. The well may be low. Turn off the power to the pump until source has recharged (the well has water in it). | • Marginal or low producing well<br>• The pump may exceed well capacity. Restrict pump output or install smaller pump.<br>• Check the pumping water level. |
| | | C. The line to the pressure switch may be plugged, so that the switch cannot read tank pressure. Check the tank pressure. If it is below cut-in pressure setting, complete Steps 1–6 of “Providing Routine Maintenance” on page 1. Look at the contacts to confirm that the contacts are closed. Complete remaining steps in “Providing Routine Maintenance” on page 1. | 1. Remove the pressure switch from the pipe and confirm that the entry to the diaphragm is free of silt and obstructions.<br>2. Confirm that any check valves in the system between the source and the pressure tank are functioning properly.<br>3. Confirm that pressure reading at the pressure switch accurately reflects the pressure in the pressure tank. |
| | Switch contacts severely burned | Insects or objects may have entered the space between the contacts. Remove nests or other havens for insects or vermin near the switch. | Replace the contacts. |
| | | The pump is too large. | Add a contactor designed for the load. |
| | | The application requires a switch with heavy duty contacts. | Replace the switch. Use higher hp rating. |
| **Rapid cycling (erratic operation)** | Tank waterlogged | For pre-charged tanks, check the bladder or air valve for leaks and check tank pressure. If it is below cut-in pressure setting, complete Steps 1–5 of “Providing Routine Maintenance” on page 1.<br>Drain some air from the compressed air valve stem. If water comes out, the bladder is leaking. Completely drain the bladder and recharge with air as required. Complete the remaining procedures in “Providing Routine Maintenance” on page 1. | Replace or repair the pressure tank. |
| | Tank not charged | For pre-charged tanks, check the bladder or air valve for leaks and check the tank pressure. If it is below cut-in pressure setting, complete Steps 1–5 of “Providing Routine Maintenance” on page 1.<br>Drain some air from the compressed air valve stem. If water comes out, the bladder is leaking. Completely drain the bladder and recharge with air as required. Complete the remaining procedures in “Providing Routine Maintenance” on page 1. | 1. Replace or repair the pressure tank.<br>2. For conventional tanks, check air volume control for proper operation. Drain and recharge tank. Clean or replace any faulty parts. |
| | Diaphragm damaged | During routine maintenance (see “Providing Routine Maintenance” on page 1) water is found leaking around diaphragm. | Replace the diaphragm. |
| | Undersized tank | Restrict water usage. Limit the number of devices in operation at any one time. | Install a larger tank. |
| | Major leak in service lines | Visible water or wet spots may be present. The pump runs, but the tank is slow to fill. | Check for leaks. Replace damaged pipes or repair leaks. |
| | Faulty check valve (open) | In some systems, water can flow back into the well, emptying the tank. | Check for leaking or open check valve. Replace if defective. |
| | Foreign material (calcium deposits) | The line to the pressure switch may be plugged and the switch cannot read the tank pressure.<br>Check the tank pressure. If it is below cut-in pressure setting, complete Steps 1–5 of “Providing Routine Maintenance” on page 1. Look at the contact plate to confirm that the contacts are closed. Complete the remaining procedures in “Providing Routine Maintenance” on page 1. | There may be a block in the line allowing the pressure switch to see high pressure all the time. |
| | No holding tank | — | Install a properly sized holding tank. |


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**Table 2: Troubleshooting Tips** *(continued)*

| Condition | Possible Causes | Description/Corrective Action | Corrective Procedure for Qualified Service Personnel |
|---|---|---|---|
| **Pump cycles each time water is used** | Tank waterlogged | For pre-charged tanks, check the bladder or air valve for leaks and check tank pressure. If it is below cut-in pressure setting, complete Steps 1–5 of "Providing Routine Maintenance" on page 1.<br>Drain some air from the compressed air valve stem. If water comes out, the bladder is leaking. Completely drain the bladder and recharge with air as required. Complete the remaining steps under "Providing Routine Maintenance" on page 1. | 1. Replace or repair the pressure tank.<br>2. For conventional tanks, check air volume control for proper operation. Drain and recharge tank. Clean or replace any faulty parts. |
| **Pressure switch chattering (contact chatter or bounce)** | Incorrect air pressure in the bladder | Adjust the air pressure in the bladder to manufacturer's specification. See the procedures for waterlogged tank. | For conventional tanks, check the air volume control for proper operation. Drain and recharge tank. Clean or replace any faulty parts. |
| | Excessive vibration | The pressure switch may be mounted on rigid pipe and secured by brackets to the structure. If the pump is also tightly secured, vibration may be amplified. | Mount the pressure switch to a less rigid pipe, and shock mount any brackets. |
| | | Isolate the switch from other sources of vibration by shock mounting. | |
| **Pump shuts off immediately after startup** | High pressure pump or a new pump | Add a surge reducer. | Order 1530S6G1 for a bag of 50. |
| **Long pump run, or pump will not shut off** | Too many water outlets | Limit the number of devices running at any one time. | — |
| | | Increase the size of the pump and/or storage tank | Replace the components as desired |
| | Worn pump parts | — | Check the pump for worn impellers, casing, or other close fitting parts. |
| | Water leaks | Check for leaks in service lines. | Repair the leaks as required |
| | | Plugged discharge pipes | Check for plugged discharge pipes resulting in reduced flow. Replace the damaged pipes or repair the leaks. |
| **Switch contacts burn up** | Pump electrical rating is too high | — | Ensure that the electrical rating of the switch corresponds to the pump's electrical rating. |
| | | | Add a contactor. |
| | | | The switch may be replaced by one with heavy duty contacts. |
| **Switch will not trip (cut-in/cut-out) at desired pressure** | Incorrect pressure settings | Adjust to correct pressure settings. See procedures for waterlogged tank on page 4. | — |
| | Defective pressure gauge | Test the pressure gauge. | Replace the pressure gauge. |
| | Damaged diaphragm actuator | — | Replace the diaphragm. |
| **Cannot adjust switch to desired pressure** | Settings outside the pressure range limits of the switch | — | Replace the switch with one that has the correct range and differential |

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**Table 2: Troubleshooting Tips** *(continued)*

| Condition | Possible Causes | Description/Corrective Action | Corrective Procedure for Qualified Service Personnel |
|---|---|---|---|
| **Switch operates mechanically, but not electrically** | No power to switch | Apply power to the switch.<br>Check the circuit breaker and/or disconnect switch. If the breaker is tripped on a new installation, check the switch wiring. Reset the breaker (disconnect). | Apply power to the switch.<br>Confirm the wiring of the switch. |
| | Damaged or improperly installed wiring | Wired to the wrong contact.<br>Complete Steps 1–5 of “Providing Routine Maintenance” on page 1. | Wire to the correct contacts. |
| | | Corroded or loose connections | Make new connections or tighten the existing connections. |
| | | Damaged switch contacts | Replace the switch contacts or entire switch. |
| | | Contacts overloaded (welded) | |
| | | Complete Steps 6–10 of “Providing Routine Maintenance” on page 1. | • Remove the pressure switch from the pipe and confirm that the entry to the diaphragm is free of silt and obstructions.<br>• Confirm that any check valves in the system between the source and the pressure tank are functioning properly.<br>• Confirm that pressure reading at the pressure switch accurately reflects the pressure in the pressure tank.<br>• Low pressure cut-out (M4) has cut-out.<br>• Repair or replace the switch if defective.<br>• Clean plumbing and pressure port (replace if defective). |


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# Frequently Asked Questions

**Table 3: Frequently Asked Questions about Square D Class 9013F and 9013G Pressure Switches**

| Questions | Answers |
|---|---|
| Can I use a 9013F water pump switch on an air compressor—or a 9013FHG air compressor switch on a water system? | Yes, but not you cannot use a 9013FSG water pump switch on a compressor requiring Form X. |
| Is Form M4 (low pressure cut-out) available on the 9013GSG••• pressure switches? | No, it is not available on the 9013GSG••• pressure switches. It is only available on the 9013FSG••• and the 9013FYG••• pressure switches. |
| Where can we find information about the 9213 pressure switch? | The information can be found in the 1947 Digest under Pressure Switches. For information, contact Product Support. |
| Are 9013FRG pressure switches available in NEMA 3R? | No, reverse action 9013F pressure switches are available only in NEMA 1 enclosures. |
| Are 9013 pressure switches DC voltage rated? | Yes, the 9013 pressure switches are rated for DC as noted in Digest 174. |
| Do the 9013F and 9013G pressure switches accept both solid and stranded wire? | Yes, the 9013F and 9013G pressure switches accept both solid and stranded wire. |
| Are the 9013FSG pressure switches CSA approved? | Yes, these switches are CSA Approved, File #LR25490. |
| How can I connect a 9013G pressure switch to control a 3-phase motor with only a 2-pole set of contacts? | Wire two legs of the 3-phase motor through the two poles of the pressure switch. Breaking two phases will start and stop the motor. Wire the third leg direct. Install a disconnect upstream of the pressure switch. |
| How do I select an appropriate pressure switch? | Refer to the catalog *Commercial Pressure Switches Types F and G Class 9013* (9013CT9701) or *Industrial Pressure Switches* (9012CT9701) located in the Technical Library at www.us.SquareD.com. |
| Will a 9013G pressure switch handle 20 A at 230 V, 1-phase and 3 hp? | The 9013G pressure switches are not current rated devices. They are hp rated devices only. To use on 3-phase circuits, wire 2 phases through the 2 poles of the switch and direct wire the third phase to one of the motor leads. This makes the lead live when the pressure switch is off. |
| Can a 9013FSG2J20 pressure switch be installed horizontally, rather than the standard vertical mounting? | Yes. The 9013FSG2J20 pressure switch can be mounted horizontally and still work properly. |
| Is the catalog number for the 9013 pressure switch valid without the pressure code? | No. You must have the J code pressure setting to order this product. If a list of pressure settings is not available, use J99 and include the setpoints desired. The setpoints must fall within the range of the pressure switch selected. |
| Is 9013FSG120J20 a valid catalog number? | No. That number indicates that all 9013FSG1 through 9013FSG20 pressure switches with Form M4 have a different pressure range than the standard pressure switches. |
| What is the difference between a series B and series C 9013 pressure switch? | Functionally, they are the same device. A series change could have been due to a minor change in the device. When ordering, customers will receive the latest series available. |
| What is the temperature range for a 9013F and 9013G pressure switches? | These temperature ratings apply to all the 9013F and 9013G pressure switches:<br>Fluid media: -30 to 125 °C (-22 to +257 °F).<br>Ambient temperature rating: -30 °C to 70 °C (-22 to +158 °F). |
| What is the maximum allowable pressure for a 9013FRG pressure switch? | The maximum allowable pressure for a 9013 FRG, GHB, GHG, GSB and GSG pressure switch is 300 psi. |
| What is the replacement contact kit for a 9013GHG5 pressure switch? | The replacement contact kit is 9998 PC205. |
| Is the 9013GSG2J23R commercial pressure switch available with an override switch? | No. The closest product with an override switch is the 9012GSG pressure switch with Form E (On-Auto-Off lever). |
| Is the low pressure cut-off option on a 9013 pressure switch adjustable? | The low pressure cutoff remains fixed at 10 psi below the low pressure cut-in for the pressure switch. Although it is not independently adjustable, it will follow the low pressure set point. However, the pressure switch will not be effective if the cut-in point is set below 10 psi. |
| How do I select an appropriate pressure switch? | Refer to the catalog Commercial *Pressure Switches Types F and G Class 9013* (9013CT9701), *Industrial Pressure Switches* (9012CT9701), or *Nautilus™ Electronic Pressure Sensors, XMLE, XMLF, XMLG* (9014CT0201). |
| Is 9998PC52 parts kit still available? | Parts kit 9998PC52 is no longer available.<br>This parts kit, and all pressure switches using a bellows assembly in their construction are obsolete. Cross reference the old pressure switch to current products. The available cross referenced products use diaphragms or pressure transducers. |
| What is the function of a pulsation plug in a 9013 pressure switch? | The pulsation plug slows the flow of fluid to the diaphragm of the pressure switch to reduce the surge rate of change. The switch with the plug installed senses change over longer intervals and does not respond to spikes. |

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## Recommended Protection

Install electrical surge protection at the service entrance and in the control box at the wellhead.

The installer should provide motor circuit overload protection in the pump motor or control box (if used).

## For Additional Information

For additional information about common product catalog numbers, visit: www.us.SquareD.com/pumptrol

Schneider Electric's Pumptrol product manager strives to provide the best value and service to our Pumptrol customers. For answers to your specific questions or comments about pumping solutions or products:

e-mail: Pumptrol@us.schneider-electric.com

## Technical Support

Technical support is provided Monday through Friday between the hours of 8:00 a.m. and 6:00 p.m. EST. For more information, write or call:

Mailing address:
Schneider Electric Pumptrol Product Line
8001 Knightdale Boulevard
Knightdale, NC 27545-9023

e-mail: control.support@us.schneider-electric.com

Telephone: 1-888-SquareD (1-888-778-2733)

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